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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/702,718	03/19/97	MULLER-ROBER B	AGREVO-1

HM22/0118

JAMES F HALEY JR
FISH & NEAVE
1251 AVENUE OF THE AMERICAS
NEW YORK NY 10020

EXAMINER	
BUI, P	
ART UNIT	**PAPER NUMBER**
1638	27

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

1- File Copy

PTO-90C (Rev. 2/95)

Office Action Summary

Application No.	Applicant(s)
08/702,718	Muller-Rober et al.
Examiner	**Group Art Unit**
Phuong Bui	1638

X Responsive to communication(s) filed on *Jul 14, 2000*

This action is **FINAL.**

Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

X Claim(s) *71 and 74-120* is/are pending in the applicat

Of the above, claim(s) *78, 86, 87, 89, 90, 92, 93, 102, 103, 106, 107, 109, 110,* is/are withdrawn from consideration

Claim(s) _____ is/are allowed.

X Claim(s) *71, 74-76, 79-85, 88, 91, 94-101, 104, 105, 108, 111, 112, and 115-120* is/are rejected.

X Claim(s) *77* is/are objected to.

Claims _____ are subject to restriction or election requirement.

Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on _____ is/are objected to by the Examiner.

The proposed drawing correction, filed on _____ is approved disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

X Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

X All Some* None of the CERTIFIED copies of the priority documents have been

received.

received in Application No. (Series Code/Serial Number) _____.

X received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

X Notice of References Cited, PTO-892

X Information Disclosure Statement(s), PTO-1449, Paper No(s). *8 and 22*

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

1. The Office acknowledges the receipt of Applicant's response, Paper No. 26, filed November 6, 2000. Applicant previously elected Group I and species VI, with traverse in the response received October 12, 1999, Paper No. 19. Based on this election, the Office proceeded with examination of the elected invention and species by Office action of January 10, 2000. However, as pointed out by Applicant in the response and amendment of July 14, 2000, the January 10 Office action was defective in that it failed to examine claims 46, 60, and 63 on the merits even though these claims cover the elected invention and species. Given the significant number of claim amendments and new claims introduced in the July 14 amendment, the Office required Applicant to identify which of the claims now read on the elected invention and species so as to avoid any further delays in prosecution.

By the most recent response of November 6, Applicant has identified claims 71, 74-101, 104-112 and 115-120 as reading on the elected invention I. In addition, Applicant has identified claims 71, 74-77, 79-85, 88, 91, 94-101, 104-105, 108, 111-112 and 115-120 as reading on the elected species. Applicant asserts that because of the indication of allowance of genus claims 17 and 71, the species election should be withdrawn. For reasons set forth in the action below, the indication of allowable claims is hereby withdrawn. Accordingly, the species election stands for reasons of record.

Accordingly, claims 71 and 74-120 are pending. Claims 78, 86- 87, 89-90, 92-93, 102-103, 106-107, 109-110 and 113-114 are nonelected. Claims 71, 74-77, 79-85, 88, 91, 94-101, 104-105, 108, 111-112 and 115-120 to the extent of species VI (citrate synthase of *S. tuberosum* or SEQ ID NO:1) are examined in the instant application.

Restriction Requirement

2. Applicant's election with traverse of invention I, species IV in Paper No. 19 is acknowledged. The traversal set forth in Paper No. 24 is on the ground(s) that there is no burden in examining inventions I, III and IV. This is not found persuasive because the basis for restriction in this case is lack of unity of invention since this Application was filed under 35 U.S.C. 371. Accordingly, there is no standard of burden required for maintaining a restriction where the Office holds that two or more inventions lack unity of invention therebetween.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

3. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Information Disclosure Statement

4. An initialed copy of Applicant's form 1449 (Paper No. 8) is attached to this Office action. The Office regrets any inconvenience the delay in forwarding an initialed copy may have caused Applicant.

35 U.S.C. 112, second paragraph

5. Claims 84-85, 88, 91, 94-99, 112, and 115-117 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 84, line 2, a parenthetical is set forth enclosing "EC No. 4.1.3.7." It is not clear whether or not Applicant intended this parenthetical to limit the citrate synthase of the claim. In addition, on lines 2 and 3 of claim 84, a coding region for a citrate synthase is recited. However, on line 6, the claimed DNA molecule is recited to be as small as 15 basepairs. These two limitations do not appear to be in agreement with each other. The coding regions for each of the known or disclosed citrate synthase genes are all greater than 15 basepairs. Accordingly, the later limitation that the claimed molecule can be as small as 15 basepairs is inconsistent with the earlier recitation of the citrate synthase coding region.

In claim 112, a process for inhibiting flower formation in a transgenic plant compared to flower formation in a wild type plant is set forth. However, the claim does not provide a concluding step by which this result is achieved.

Clarification and/or correction are required.

35 U.S.C. 112, first paragraph

6. The rejection of claim 58 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention is **withdrawn** in view of Applicant's amendment.

7. The rejection of claim 18 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention is **withdrawn** in view of the Statement by Applicant's representative regarding the deposit filed July 14, 2000.

8. The rejection of claims 1-3, 5, 18, 20, 21, 24, 28, 39, 43, 49, 52, 56-58, 61, 62, 66 and 69, 70, 72 and 73 are rejected under 35 U.S.C. 112, first paragraph, enablement is **withdrawn** in view of Applicant's amendment and the state of the art.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 71, 74-76, 79-85, 88, 91, 94-101, 104-105, 108, 111-112, 115-120 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al. (Plant Molecular Biology 13: 411-418, 1989) in view of Shewmaker et al (U.S. Patent 5,107,065).

The claims recite a DNA molecule, vector, transformed bacterial or plant cell, transgenic plant and seed each having a promoter functional in plants and a DNA sequence at least 15

basepairs in length from a citrate synthase coding region fused to the promoter in antisense orientation. The claims further recite methods for reducing citrate synthase production and inhibiting flower formation using the DNA molecule.

Unger et al. teaches a citrate synthase protein and gene therefor from *Arabidopsis thaliana*. As shown in the attached sequence search report, the enzyme of Unger has over 65% structural match to SEQ ID No: 2. Moreover, the sequence of the DNA encoding this enzyme has nearly 30% overall structural identity to SEQ ID No: 1, including stretches of at least 15 basepairs that exhibit 100% identity. Unger et al. does not teach fusing the citrate synthase gene or a portion thereof in antisense relation to a plant functional promoter.

Shewmaker et al. teaches regulation of expression in plant cells is achieved by integrating into the plant cell a DNA sequence in complementary or antisense orientation (col. 1, lines 58-62) and that transcription of such DNA results in anti-sense mRNA that will reduce the functioning of the naturally existing RNA. Shewmaker also teaches that such reduction is particularly useful in modulating phenotypic properties of a plant (col. 2, lines 18-20). Modulation of metabolic pathways and their enzymes is specifically mentioned (col. 2, lines 25-32). Shewmaker discusses the minimum requirements for successful use of antisense mRNA including a minimum sequence length of 15 basepairs. The DNA sequence may be fused to a plant functional promoter (col. 3, lines 7-44) and may be introduced into a plant by a variety of ways including a transformed bacterial host (col. 3, lines 61-68). The use of antisense mRNA may be employed in any plant including grain plants, fruit plants, vegetable plants, ornamental plants, tubers, beet, tobacco,

potato, manioc, rapeseed and sugar cane (col. 4, lines 1-14). Inhibition of flowering may be the phenotypic property desired (col. 4, lines 38-39). Finally, Shewmaker teaches that alteration of a component content in plants can be modulated by using antisense mRNA to an enzyme involved in the metabolic pathway for that component (col. 4, lines 43-68).

It would have been obvious to one of ordinary skill in the art to have used the DNA sequence for the citrate synthase gene of Unger following the teachings of Shewmaker to produce a DNA construct comprising a portion of at least 15 basepairs from or at least 65% identity to a DNA sequence encoding Unger's citrate synthase fused to a plant functional promoter. One skilled in the art would have motivated to have done so with a reasonable expectation of success because Unger teaches the importance of the citrate synthase for studying the balance of energy-generating processes uniquely available to photosynthetic cells. Further, this enzyme was well known for both its catalytic activity and metabolic pathway. Accordingly, given that Shewmaker teaches that antisense technology is especially useful for modulating metabolic pathways for modulating phenotypic properties in plants, one would have expected that use of antisense mRNA would inhibit citrate synthase with a reasonable expectation of success. Although Unger does not teach the relationship between citrate synthase and flower formation, one skilled in the art would have found it obvious to use antisense mRNA for citrate synthase for other reasons as stated above. It would further have been obvious to have transformed a bacterial cell with the antisense construct where the bacterial cell is later used to transform a plant cell as suggested by Shewmaker.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bourque et al. (U.S. Patent 5,354,854) has been cited for an alternative teaching of antisense technology applied to regulate expression of endogenous genes in plants including metabolic enzymes.

13. Claim 77 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

This claim recites a deposited plasmid which contains SEQ ID No:1 in antisense orientation. The prior art neither teaches nor suggests this plasmid.

14. The previous indication of allowability of claims 17 and 71 is **withdrawn** in view of the prior art rejection applied above. However, claims limited to a DNA molecule comprising a plant functional promoter and SEQ ID NO:1 (or DNA encoding SEQ ID No: 2) fused in antisense orientation thereto would define over the prior art of record.

Application/Control Number: 08/702718

Art Unit: 1638

Remarks

No claim is allowed.

Papers relating to this application may be submitted to Technology Sector 1 by facsimile transmission. Papers should be faxed to Crystal Mall 1, Art Unit 1638, using fax number (703) 308-4242. All Technology Sector 1 fax machines are available to receive transmissions 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform with the Notice published in the Official Gazette, 1096 OG 30, (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuong Bui whose telephone number is (703) 305-1996. The Examiner can normally be reached Monday-Friday from 6:30 AM - 4:00 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Paula Hutzell, can be reached at (703) 308-4310.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0196.

Phuong Bui
Primary Examiner
Group Art Unit 1638
January 15, 2001

Phuong Bui

PHUONG T. BUI
PRIMARY EXAMINER